

LABORATORY
OF THE
INLAND REVENUE DEPARTMENT

BULLETIN No. 97.

FERTILIZERS, 1904.

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OTTAWA, July 15, 1904.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR,—I submit herewith a tabulated statement, marked Table I., containing a description of 111 standard samples of agricultural fertilizers, which were sent in to the Department of Inland Revenue by their manufacturers, importers or vendors, in accordance with the provisions of the Fertilizers Act, 1890, and as representing the goods which it was proposed to offer for sale in Canada during the year 1904. The number of such samples is 111, and shows a diminution compared with the previous year when 128 were submitted.

Table I. gives the designations of the various brands of fertilizers, the names of the manufacturers or importers, the claims made as regards their contents in fertilizing ingredients, and the actual percentages of these found in the standard samples on analysis in this laboratory. The guaranteed contents are given in the upper line, and the analytical results in the second line placed opposite the designation of the fertilizer. In many cases the claims made are imperfect and indefinite, and in some, the requirements of the Act calling for a certificate of analysis, and a statement of the materials used in the manufacture of the fertilizer have been neglected. With regard to indefinite claims it may be stated that these are often made by manufacturers of repute, when, for instance, a particular sample is described as containing 'from 2.5 to 3.0 p.c. of ammonia,' or 'from 8 to 9 p.c. of available phosphoric acid,' or 'from 9.5 to 11 p.c. of potash.' In such instances if an ingredient is found deficient in the sample sold in the open market, and it is challenged, the manufacturer sometimes defends himself by maintaining that his guarantee does not extend above the lowest of the figures mentioned. For this reason the 'guaranteed contents' of a fertilizer, as stated in Table I, must be understood to indicate only the lowest percentage given on the manufacturer's label, or in his correspondence with the department.

As required by the Fertilizers Act, Table I also contains a column in which 'the relative value of each fertilizer calculated from the contents in fertilizing ingredients' is given, the prices of these ingredients being taken as follows :—

	Cents per lb.
Nitrogen in salts of ammonia or nitrates as well as in compound fertilizers.....	13
Organic nitrogen in ground bone, fish blood or tankage.....	12
Phosphoric acid :—	
Soluble in water.....	6
Soluble in 1 p.c. citric acid.....	5½
Insoluble in 'Thomas' Phosphate Powder.....	3½
Insoluble in ground rock phosphate and fertilizers generally.....	1½
Potash from high grade salts.....	5½

The valuation of each brand is calculated on the results of the analysis of the standard samples, but it has been omitted in the case of the guaranteed contents on account of the imperfect character of the information supplied in the majority of cases.

I have also to submit a description of the fertilizer samples which were collected, as sold in the open market, in accordance with your instructions of 14th January last. This description is called Table II, and contains the date of collecting the samples, the names of the vendors and manufacturers, the designation of the brands, and the results of the analysis. The figures obtained in examining the samples as sold are given on the same line which shows the name of the fertilizer. On the second line will be found the particulars of the manufacturers' guarantee, when the brand has been registered. On the third line is given the analysis of the corresponding standard sample, if it has been supplied to the department. In cases where no standard samples have been sent in to the department and nevertheless, in contravention of the Fertilizers Act, the fertilizers have been offered for sale, it has of course not been found possible to give either the guaranteed contents or the analysis of a standard sample. The number of such fertilizers not registered and therefore illegally sold amounts to 24, more than twice as many as in former years. It would appear to be necessary to take some action to suppress this selling of fertilizers, in regard to which the vendors have made no effort to comply with the law.

According to the opinions expressed by the district analysts 13 out of the 96 samples collected have been found to be adulterated according to the Act, being deficient in available phosphoric acid or other fertilizing constituent. Further action under the Act would also seem to be necessary in these cases.

In my report of May 13, 1901 (Bulletin No. 75), the proceedings were fully detailed with regard to an alteration in the method of determining the available phosphoric acid in fertilizers, the adoption of which was then authorized by the Commissioner of Inland Revenue. This method has since been carried out in this laboratory, and in those of the district analysts, and has worked very satisfactorily. From its results it would appear that the solubility of the phosphoric acid in non-acidulated samples increases in the following order :—1, bonemeal ; 2, tankage ; 3, Thomas' Phosphate Powder or basic slag. The "citric soluble" phosphoric acid of our analysis corresponds pretty closely with the "reverted" claimed by United States manufacturers. Since they still continue to mention, in their guarantees, a percentage of "reverted" phosphoric acid, it seems necessary to state that in Canada, a determination of "citric soluble" phosphoric acid is substituted for that of "reverted." The details of the process adopted here for ascertaining the percentage of "available" phosphoric acid contained in agricultural fertilizers will be found in Bulletins 75 and 86.

I beg to recommend the publication of this report, together with Tables I and II as well as the memoranda on manures, which it has been customary to print at the end of the annual Fertilizer Bulletin.

I have the honour to be sir, your obedient servant,

THOMAS MACFARLANE,

Chief Analyst.

TABLE I.—Statement of the Results of Examining 111 Standard

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1492	Essex Complete Manure for Corn, Grain and Grass.	Russia Cement Co.	S. C. Shaffner, Granville Ferry, N.S.	(Dry ground fish, ground fish bone, high grade muriate of potash, high grade sulphate of potash, nitrate of soda, dry ground blood, &c.	Guaranteed contents Standard sample....
1493	Essex Complete Manure for Potatoes, Roots and Vegetables.	"	"	"	Guaranteed contents Standard sample....
1494	Essex 'A 1' Superphosphate.	"	"	Superphosphate of lime.	Guaranteed contents Standard sample....
1495	Essex XXX Fish and Potash.	"	"	"	Guaranteed contents Standard sample....
1496	Essex Orchard Fertilizer.	"	"	"	Guaranteed contents Standard sample....
1497	Essex Fine Bone Meal.	"	"	"	Guaranteed contents Standard sample....
1498	Essex Market Garden and Potato.	"	"	"	Guaranteed contents Standard sample....
1499	Essex Dry Ground Fish.	"	"	"	Guaranteed contents Standard sample....
1500	Fertilizer.....	Laing Packing and Provision Co., Ltd., Montreal.	Manufacturers ...	Blood, offal and tankage from hogs and cattle.	Guaranteed contents Standard sample....
1501	Fertilizer 'A'.....	Harris Abattoir Co., Ltd.	Edward Adie, Sec'y Treas., Toronto.	Dried blood, bone and tankage.	Guaranteed contents Standard sample....
1502	Fertilizer 'A'.....	The Wm. Davis Co., Ltd., Toronto.	Manufacturers ...	"	Guaranteed contents Standard sample....
1503	Fertilizer 'C'.....	"	"	Tank water condensed and dried.	Guaranteed contents Standard sample....
1504	Reid's Superphosphate.	Thos. Reid, St. John, N.B.	"	"	Guaranteed contents Standard sample....
1505	No. 1 Brand.....	Nichols Chemical Co. of Canada, Capelton, Que.	"	Canadian apatite dissolved with sulphuric acid, muriate of potash and sulphate of ammonia.	Guaranteed contents Standard sample....
1506	Reliance.....	"	"	"	Guaranteed contents Standard sample....
1507	Royal Canadian.....	Nichols Chemical Co. of Canada, Capelton, Que.	Manufacturers....	"	Guaranteed contents Standard sample....
1508	Victor.....	"	"	"	Guaranteed contents Standard sample....
1509	Crown.....	"	"	"	Guaranteed contents Standard sample....
1510	Capelton Brand.....	"	"	"	Guaranteed contents Standard sample....

Samples of Commercial Fertilizers, registered for 1904.

RESULTS OF ANALYSIS.										Relative Value per Ton of 2,000 lbs.	Name of Analyst and Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.			
Total including Nitric Acid and Ammonia.	Total Calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	3 cts.		
3.30	4.00	3.00	4.00	2.50	9.50		9.50				
3.15	3.82	6.20	3.08	1.32	11.20	9.28	9.92	11.05	29.99	1492 J. G. A. Valin.	
3.70	4.50	3.00	4.00	2.00	9.00		8.50				
4.21	5.35	7.16	1.92	1.79	10.87	9.08	7.24	8.60	30.19	1493 "	
	1.25				9.00	7.00	2.00				
0.87	1.05	1.79	5.69	5.12	12.60	7.48	1.66	5.80	13.82	1494 "	
	2.50	4.50	4.50	3.00	12.10		2.50				
1.51	1.83	5.63	5.05	2.56	13.24	10.68	2.53	10.55	19.63	1495 "	
	2.00	4.00	3.00	2.00	9.00		8.50				
1.84	2.24	3.98	4.15	4.47	12.60	8.13	8.19	6.00	24.04	1496 "	
	3.00		24.00		24.00						
2.24	2.72		12.75	13.48	26.23	12.75	0.30	3.95	24.19	1497 "	
2.00	2.40	4.00	4.00	2.00	10.00		5.00				
2.10	2.55	4.47	7.23	0.77	12.47	11.70	3.99	8.80	23.14	1498 "	
	8.00		11.00		11.00			8.00			
8.47	10.28		11.32	3.20	14.52	11.32	0.16	9.00	33.89	1499 "	
6.23	7.56				13.31			10.61			
6.78	8.22		10.88	2.39	13.27	13.88		11.24	28.98	1500 Miss E. Davidson.	
9.13	11.08				5.86			6.02			
9.60	11.66		4.64	1.43	6.07	4.64		5.84	28.56	1501 "	
6.93	8.42				13.72			8.00			
6.58	7.99		14.40	1.59	15.99	14.40		6.32	32.10	1502 "	
12.83	15.58				2.82			8.42			
12.99	15.77		2.71	0.32	3.03	2.71	1.25	8.40	35.56	1503 "	
3.02	3.66	3.16	2.22	5.36	10.74	5.38	2.28	27.46	18.07	1504 "	
None.	None.	9.72	1.48	6.20	17.40	11.05					
						11.20	None.	11.85	15.14	1505 A. Lemoine.	
	2.00					6.00	2.00				
1.63	2.04	6.84	1.35	4.60	12.79	8.19	3.76	10.15	19.36	1506 "	
	4.00					9.00	5.00				
2.80	3.40	7.16	1.48	3.96	12.60	8.64	6.68	9.40	25.68	1507 A. Lemoine.	
	2.00					7.00	3.00				
1.96	2.38	4.15	2.89	2.36	9.40	7.04	4.49	9.75	18.05	1508 "	
	2.00					11.00	2.50				
2.87	3.48	11.00	0.65	2.87	14.52	11.65	3.68	1.90	26.09	1509 "	
						8.00					
None.	None.	4.92	2.34	4.25	11.51	7.26	None.	10.40	9.74	1510 "	

TABLE I.—Statement of the Results of Examining 111 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1511	Williams & Clarke American Potato Manure.	American Agricultural Chemical Co., Boston, Mass.	Ross L. Coe, Local Treasurer, Boston.	Bone black, animal bone, phosphatic guano, dried fish meat or blood, nitrate of soda or sulphate of ammonia sulphate, or muriate of potash and sulphuric acid.	Guaranteed contents Standard sample....
1512	Pacific Potato Special.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1513	Pacific Nobisque Guano.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1514	Pacific Fine Ground Bone.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1515	Soluble Pacific Guano.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1516	Tucker's Imperial Bone Superphosphate.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1517	Bradley's Eclipse Phosphate.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1518	Bradley's XL Superphosphate of Lime.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1519	Bradley's Potato Fertilizer.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1520	Bradley's Farmers New Method Fertilizer.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1521	Bradley's First Ground Bone.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1522	Read's Standard Superphosphate.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1523	Read's Practical Potato Special.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1524	Read's Sure Catch Fertilizer.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1525	Quinnipiac Climax Phosphate for all crops.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1526	Cumberland Superphosphate.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1527	Cumberland Potato Fertilizer.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1528	Cumberland Fine Ground Bone.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1529	Great Eastern High Grade Special Potato Manure.	American Agricultural Chemical Society.	Great Eastern Fertilizer Branch, Rutland, Vt.	" " "	Guaranteed contents Standard sample....
1530	Great Eastern Northern Corn Special.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1531	Great Eastern Potato Manure.	" " "	" " "	" " "	Guaranteed contents Standard sample....
1532	Great Eastern General Fertilizer.	" " "	" " "	" " "	Guaranteed contents Standard sample....

of Commercial Fertilizers, registered for 1904—Continued.

RESULTS OF ANALYSIS.										Relative value per ton of 2,000 lbs.	Name of Analyst and Number of Sample.
Nitrogen.		Phosphoric Acid.					Pot. ash.	Moisture.			
Total including that of Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
2.06 1.80	2.50 2.29	5.00 6.72	3.00 2.37	2.00 1.79	10.00 10.88	8.00 9.09	3.00 2.16	13.10	18.36	1511 J. G. A. Valin.	
2.06 1.90 1.65 1.65 2.50 2.53 2.06 2.10 1.03 1.26	2.50 2.31 1.25 1.27 3.00 3.19 2.50 2.55 1.25 1.53	5.00 6.20 6.00 6.08 5.00 6.52 6.00 6.20	3.00 2.75 2.00 3.01 3.00 2.44 2.00 3.08	2.00 2.05 2.00 1.79 2.00 2.36 2.00 2.23	10.00 11.00 10.00 10.88 21.00 19.51 10.00 11.32 10.00 11.51	8.00 8.95 8.00 9.09 8.00 8.96 8.00 9.28	3.00 2.16 2.00 1.74 1.50 1.83 2.00 2.43	13.45 9.80 6.25 13.15 10.90	18.27 15.68 22.14 18.58 17.30	1512 " 1513 " 1514 " 1515 A. Lemoine. 1516 "	
1.03 1.26 2.06 2.12 2.06 2.10 1.03 1.08	1.25 1.53 2.50 2.58 2.50 2.55 1.25 1.31	6.00 6.52 5.00 6.20 5.00 6.20 6.00 7.84	2.00 2.57 3.00 3.40 3.00 2.80 2.00 2.24	2.00 2.55 2.00 1.91 2.00 2.23 2.00 2.39	10.00 11.64 10.00 11.51 10.00 11.32 10.00 12.47	8.00 9.09 8.00 9.60 8.00 9.09 8.00 10.08	2.00 2.27 1.50 1.75 3.00 2.95 2.00 4.51	10.65 13.45 13.85 9.52	1.06 19.09 19.82 20.03	1517 " 1518 " 1519 " 1520 " 1521 M. J. Davidson.	
2.50 2.91 0.82 1.07 0.82 1.03 0.56 1.03 0.98	3.00 3.53 1.00 1.30 1.00 1.25 0.68 1.25 1.19	..... ..... 5.00 7.19 2.00 3.04 6.00 10.36 6.00 7.04	..... ..... 3.00 3.85 2.00 2.72 4.00 1.60 2.00 1.72	6.07 2.00 2.07 1.28 1.03 2.11 2.00 2.56	21.00 20.79 10.00 13.11 11.04 7.04 11.00 14.07 10.00 11.32	..... ..... 8.00 11.04 5.00 5.76 10.00 11.96 8.00 8.76	..... ..... 4.00 9.16 2.00 2.35 2.00 0.80	5.86 9.00 9.16 7.45 9.55	24.90 22.14 18.81 18.73 14.47	1522 Miss E. Davidson. 1523 " 1524 J. G. A. Valin. 1525 "
2.06 1.96 2.06 2.52 2.50 2.03 3.30 3.30	2.50 2.38 2.50 3.06 3.00 2.46 4.00 4.01	5.00 6.40 5.00 6.85 4.00 3.71	3.00 3.64 3.00 2.55 2.00 3.20	2.00 2.11 2.00 2.11 1.00 1.08	10.00 12.15 10.00 11.51 21.00 20.02 7.00 7.99	8.00 10.04 8.00 9.40 6.00 6.91	1.50 1.79 3.00 2.14 10.00 9.57	12.10 13.40 5.90 8.80	19.27 20.44 21.51 26.91	1526 " 1527 " 1528 " 1529 A. Lemoine.	
2.06 2.24 2.06 1.10 0.82 1.30	2.50 2.72 2.50 2.55 1.00 1.58	5.00 5.95 5.00 6.07 5.00 5.88	3.00 4.41 3.00 3.53 3.00 4.16	1.00 1.28 1.00 1.40 1.00 1.28	10.00 11.64 10.00 11.00 10.00 11.32	8.00 10.36 8.00 9.60 8.00 10.04	1.50 1.62 3.00 3.03 4.00 4.53	12.35 13.60 13.60 8.75	19.89 20.22 20.13	1530 " 1531 " 1532 "	

TABLE I.—Statement of the results of Examining 111 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1533	Great Eastern Grass and Oats Fertilizer.	American Agricultural Chemical Society.	Great Eastern Fertilizer Branch, Rutland, Vt.	.....	Guaranteed contents Standard sample....
1534	Superphosphate of Lime.	Standard Fertilizer and Chemical Co., Smiths' Falls.	R. J. Brodie, Smiths' Falls.	Mineral Phosphate	Guaranteed contents Standard sample....
1535	Special Fertilizer ...	" " ..	" " ..	Nitrate of Soda Sulphate of Ammonia Potash and Magnesia Salts and Mineral Superphosphates.	Guaranteed contents Standard sample....
1536	Standard Fertilizer..	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1537	Star Fertilizer	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1538	No. 1 Fertilizer....	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1539	Royal Fertilizer.....	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1540	Nitrate of Soda.....	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1541	Swift's Lowell Bone Fertilizer.	Lowell Fertilizer Co., Boston, Mass.	Benj. Moody, Agt.	Blood, meat, bone, bone black, bone phosphate.	Guaranteed contents Standard sample....
1542	Swift's Lowell Potato Manure.	" " ..	" " ..	Nitrate of soda, sulphate of ammonia.	Guaranteed contents Standard sample....
1543	Swift's Lowell Potato Phosphate.	" " ..	" " ..	Sulphate or muriate of potash.	Guaranteed contents Standard sample....
1544	Swift's Lowell Ground Bone.	" " ..	" " ..	.....	Guaranteed contents Standard sample....
1545	Swift's Lowell Animal Brand.	" " ..	" " ..	.....	Guaranteed contents Standard sample....
1546	The New England Corn Phosphate.	The New England Fertilizer Co., Boston, Mass.	A. P. Clarke, Agt., Boston.	Blood, meat, bone, bone black, bone phosphate, nitrate of soda or sulphate of ammonia.	Guaranteed contents Standard sample....
1547	The New England Potato Fertilizer.	" " ..	" " ..	" " ..	Guaranteed contents Standard sample....
1548	The New England Corn and Grain Fertilizer.	" " ..	" " ..	Sulphate or muriate of potash.	Guaranteed contents Standard sample....
1549	Ingersoll Fertilizer "A."	Ingersoll Packing Co., Ingersoll, Ont.	C. S. Wilson, Manager, Ingersoll.	.....	Guaranteed contents Standard sample....
1550	Freeman's Sure Growth Manure.	The W. A. Freeman Co., Ltd., Hamilton.	W. A. Freeman...	Phosphate, bone, blood, tankage, sulphuric acid.	Guaranteed contents Standard sample....
1551	Bone and Potash....	" " ..	" " ..	Muriate of potash, sulphate of potash, sulphate of ammonia and nitrate of potash.	Guaranteed contents Standard sample....

of Commercial Fertilizers, registered for 1904—Continued.

RESULTS OF ANALYSIS.										Relative value per ton of 2,000 lbs	Name of Analyst and Number of Sample.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.			
Total including Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.					
p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	\$ cts.		
.....	.....	6 00 9 40	5 00 2 76	1 00 1 40	12 00 13 56	11 00 12 16	2 00 2 29	7 70	17 13	1533
0 14	0 17	10 04	1 99	4 60	16 00 16 63	14 00 12 03	.....	10 75	15 96	1534
3 15	3 50 3 82	7 35	0 78	2 75	10 00 10 88	8 00 8 13	6 00 7 00	8 55	26 03	1535	
2 52	2 50 3 06	7 16	1 15	3 65	11 00 11 96	9 00 8 31	2 00 2 08	8 50	19 67	1536	
1 82	2 00 2 21	4 15	0 58	1 67	6 00 6 40	5 00 4 73	2 00 1 64	3 85	12 56	1537	
1 78	2 00 2 16	6 40	1 08	4 48	11 00 11 96	9 00 7 48	1 25 1 64	9 46	16 54	1538	
1 94	2 00 2 36	5 11	2 37	2 43	9 00 9 91	8 00 7 48	3 00 3 09	8 25	18 73	1539	
14 92	18 05 18 12	.....	.....	.....	.....	.....	.....	.....	.....	1540
1 79	2 00 2 17	3 34	5 45	0 80	9 00 8 59	8 00 8 79	3 00 3 05	2 35 10 35	38 79 18 08	1541	
1 70	2 00 2 17	4 79	1 92	0 96	8 00 7 67	7 00 6 71	4 00 5 04	10 90	17 17	1542	
2 73	3 00 3 31	4 03	4 28	1 15	9 00 9 46	8 00 8 31	6 00 6 08	8 65	23 34	1543	
2 59	3 00 3 14	.....	14 07	12 79	26 86 14 07	.....	.....	3 16	25 51	1544
2 28	3 00 2 79	8 15	2 57	1 75	10 00 12 47	9 00 10 72	4 00 4 13	11 08	23 37	1545	
2 75	2 00 3 34	5 27	4 17	1 43	9 00 10 87	8 00 9 44	3 00 3 43	9 08	22 07	1546	
1 93	2 00 2 34	5 91	1 92	0 96	8 00 8 79	7 00 7 83	4 00 5 50	10 72	20 26	1547	
1 02	1 50 1 24	6 71	0 81	0 95	8 00 8 47	7 00 7 52	2 00 1 79	10 20	13 44	1548	
7 00	9 00 8 50	Trace	5 50 9 31	6 80 0 60	..... 9 91	..... 9 31	.....	8 00 12 50	27 22	1549
2 94	3 50 3 57	5 75	3 53	6 39	8 00 15 67	3 00 9 28	3 00 3 07	11 75	23 55	1550	
2 24	2 00 2 72	6 07	3 21	5 11	9 00 14 39	6 00 9 28	6 00 6 95	9 70	25 45	1551	

TABLE I.—Statement of the Results of Examining 111 Standard

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1552	Celery and Early Vegetable Manure.	The W. A. Freeman Co., Ltd., Hamilton.	W. A. Freeman.	Muriate of potash, sulphate of potash, sulphate of ammonia and nitrate of potash.	Guaranteed contents. Standard sample....
1553	Phosphate Powder.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1554	Freeman's Potato Manure.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1555	Freeman's Tankage Manure.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1556	Freeman's Tobacco Manure.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1557	Freeman's Pure Bone Meal.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1558	Brand H Fertilizer.	W. Harris & Co., Toronto.	Manufacturers....	Blood, Flesh and Bone.	Guaranteed contents. Standard sample....
1559	Bone Meal..	" " "	" " "	Crude Bone.	Guaranteed contents. Standard sample....
1560	Potato Phosphate...	Provincial Chemical Fertilizer Co., St. John, N.B.	" " "	" " "	Guaranteed contents. Standard sample....
1561	Imperial Superphosphate	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1562	Victor Guano	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1563	Bone Meal.....	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1564	Bone, Blood and Potash.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1565	Potato Phosphate...	The Nova Scotia Fertilizer Co., Halifax, N.S.	C. M. Jack, Mn'gr	" " "	Guaranteed contents. Standard sample....
1566	Ceres Superphosphate.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1567	Bone Meal.....	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1568	Fruit Tree Fertilizer	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1569	Blood, Bone and Potash.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1570	High Grade Southern Guano.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1571	Bone and Potash....	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1572	Bradleys New Method Fertilizer.	American Agricultural Chemical Co., Boston.	Buffalo Sales Dept., Buffalo.	" " "	Guaranteed contents. Standard sample....
1573	Bradleys B. D. Sea Fowl Guano.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1574	Bradleys Complete Manure for Potatoes and Vegetables.	" " "	" " "	" " "	Guaranteed contents. Standard sample....
1575	Crokers Wheat and Corn Fertilizer.	" " "	" " "	" " "	Guaranteed contents. Standard sample....

Samples of Commercial Fertilizers, registered for 1904—Continued.

RESULTS OF ANALYSIS.										Relative value per ton of 2,000 lbs	Name of Analyst and Number of Sample.
Nitrogen.		Phosphoric Acid.					Pot. ash.	Moisture.			
Total including Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
5.29	6.00 6.42	4.99	3.52	3.83	9.00 12.34	8.51	6.06 7.64	8.90	32.76	1552 A. Lemoine.	
					15.00 17.91	13.88		6.65	17.41	1553 "	
2.64	3.00 3.21	6.23	2.08	5.28	8.00 13.59	8.31	5.00 5.79	10.30	24.26	1554 Miss E. Davidson.	
5.67	5.00 6.88	0.00	12.16	3.83	12.00 15.99	12.16		9.84	28.11	1555 "	
5.30	6.00 6.44	5.11	3.05	3.99	7.00 12.15	8.16	7.00 6.89	7.20	31.68	1556 "	
3.43	3.00 4.16		15.51	9.75	23.00 26.26	15.51		5.96	28.21	1557 "	
6.86	8.33 5.41		5.12	2.87	7.16 7.99	5.12	1.15	9.52	25.52	1558 "	
4.66	5.88 2.50		14.40	5.27	20.15 19.67	14.40		3.12	28.60	1559 "	
2.38	2.89 7.80	1.97	3.98		13.75	9.77	6.50 5.33	7.10	24.48	1560 J. G. A. Valin.	
2.52	3.00 2.00	7.22	4.70	5.95	17.87	10.50 11.92	1.50 1.35	8.00	23.57	1561 "	
2.00	2.43 3.10	7.04	3.70	6.53	17.27	10.74	2.50 1.54	8.20	21.27	1562 "	
2.12	2.58		15.48	5.76	24.14 21.24	15.48		8.85	24.25	1563 "	
2.17	2.63 3.75	7.16	4.16	6.08	17.40	11.32 10.00	4.46 6.00	9.70	25.30	1564 "	
3.24	3.94	10.55	0.65	1.59	12.79	11.30	7.70	11.55	30.34	1565 A. Lemoine.	
2.80	3.08 3.40	9.78	1.28	1.28	12.34	11.06	2.41 7.04	13.50	28.18	1566 "	
3.94	3.00 4.79		9.60	12.47	22.07	9.60	6.00	6.75	23.75	1567 A. Lemoine.	
3.99	4.84 2.00	11.34	0.26	0.83	12.47	11.64	6.46	10.95	31.32	1568 "	
3.43	4.16 2.00	0.40	8.75	6.07	15.22	7.00 9.15	4.00 4.01	8.00	25.04	1569 "	
3.50	4.25 2.00	8.96	0.50	1.73	11.19	7.00 9.46	2.50 4.11	10.25	26.22	1570 J. G. A. Valin.	
3.50	4.25 1.00	0.49	7.49	6.09	14.07	7.98	2.00	5.04	22.64	1571 "	
0.82	1.00	6.00	2.00	1.00	9.00	8.00	2.00			1572 "	
0.91	1.10	6.85	0.69	3.65	11.19	7.54	3.34	11.30	15.93	1573 "	
2.06	2.50	6.00	2.00	1.00	9.00	8.00	1.50			1574 "	
2.10	2.55	6.85	1.01	3.33	11.19	7.86	1.52	9.80	17.37	1575 "	
3.29	4.00	6.00	2.00	1.00	9.00	8.00	7.00			1576 "	
3.36	4.08	6.09	2.74	3.60	11.83	8.83	7.33	8.75	27.72	1577 "	
2.06	2.50	6.00	2.00	1.00	9.00	8.00	1.50			1578 "	
2.10	2.55	6.21	1.79	3.06	11.00	8.00	1.50	10.20	17.34	1579 "	

TABLE I.—Statement of the results of examining 111 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1576	Crokers Cabbage Potato Manure.	American Agricultural Chemical Co., Boston.	Buffalo Sales Dept., Buffalo.		Guaranteed contents Standard sample....
1577	Crokers Harvest Jewel Fertilizer.	" " "	" " "		Guaranteed contents Standard sample....
1578	Crokers Ammoniated Bone Superphosphate.	" " "	" " "		Guaranteed contents Standard sample....
1579	Eureka.....	Pidgeon Fertilizer Co., Ltd., Windsor, U.S.	Robt. Pidgeon Manager.	Bone, Rock Phosphate, Animal Matter, Potash, Nitrate of Soda and Sulphuric Acid.	Guaranteed contents Standard sample....
1580	Intense Brand	" " "	" " "	" " "	Guaranteed contents Standard sample....
1581	Potato Manure	" " "	" " "	" " "	Guaranteed contents Standard sample....
1582	Ground Bone.....	" " "	" " "	" " "	Guaranteed contents Standard sample....
1583	Thomas' Phosphate Powder.	Chemical Works, late H. & E. Albert, Biebrich on Rhine.	The Anglo Canadian Chem. Co., St. John, N.B.		Guaranteed contents Standard sample....
1584	Albert's Concentrated Soluble Horticultural Manure, Brand A. G.	" " "	" " "		Guaranteed contents Standard sample....
1585	Fertilizer "A".....	Victoria Chemical Co., Ltd., Victoria, B.C.	John A. Hall, Treasurer, Victoria.	Nitrate of soda, muriate of potash and superphosphate of lime	Guaranteed contents Standard sample....
1586	Fertilizer "B".....	" " "	" " "	" " "	Guaranteed contents Standard sample....
1587	Fertilizer "C".....	" " "	" " "	Muriate of potash and superphosphate of lime.	Guaranteed contents Standard sample....
1588	Superphosphate of Lime.	" " "	" " "	Treating bone char with sulphuric acid.	Guaranteed contents Standard sample....
1589	Nitrate of Soda.....	" " "	" " "		Guaranteed contents Standard sample....
1590	Kainite.	" " "	" " "		Guaranteed contents Standard sample....
1591	Sulphate of Potash..	" " "	" " "		Guaranteed contents Standard sample....
1592	Muriate of Potash..	" " "	" " "		Guaranteed contents Standard sample....
1593	Thomas' Phosphate Powder.	" " "	" " "		Guaranteed contents Standard sample....

RESULTS ON ANALYSIS.										Name of Analyst and Number of Sample.
Nitrogen.		Phosphoric Acid.					Pot- ash.	Mois- ture.	Relative value per ton of 2,000 lbs	
Total in- cluding Nitric Acid and Am- monia.	Total calculat- ed as Am- monia.	Soluble in Water.	Citric Soluble.	In- sol- uble.	Total.	Total Avail- able.				
p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	\$ cts.	
2.47	3.00	6.00	2.00	1.00	9.00	8.00	6.00			1576
2.63	3.19	6.55	1.61	2.87	11.08	8.16	5.93	12.20	23.59	Miss. E. Davidson.
1.65	2.00	6.00	2.00	1.00	9.00	8.00	2.00			1577
1.82	2.21	6.23	2.57	2.55	1.35	8.80	2.58	10.40	18.48	"
2.47	3.00	6.00	3.00	2.00	11.00	9.00	2.00			1578
2.67	3.24	6.71	2.57	2.87	12.15	9.28	2.89	18.60	31.70	"
	2.50				8.00					
1.90	2.31	6.55	1.83	1.91	10.29	8.38	1.50	14.84	18.04	1579
										"
	3.50				7.00		4.50			1580
2.52	3.06	5.59	1.77	2.39	9.75	7.36	5.01	12.20	21.16	"
	3.00				8.00		4.00			1581
2.59	3.14	6.27	2.23	0.96	9.46	8.50	4.05	14.10	21.23	A. Lemoine.
	3.00				20.00					1582
3.78	4.59		11.8.	11.51	23.35	11.54		2.50	25.54	"
			16.64	2.87	18.00					1583
					19.51	16.64		0.15	20.30	"
12.32		11.30								
12.32	14.96	11.70	0.45		12.15	12.15	19.71			1584
							19.92	1.90	66.96	"
4.00					10.00		7.00			
3.78	4.59	11.51	1.15	Trace.	12.66	12.66	7.04	11.80	52.28	1585
										"
3.50					9.00		11.00			1586
3.57	4.33	10.74	0.77	Trace.	11.51	11.51	10.75	12.00	34.26	"
Trace.		13.30	1.60	Trace.	15.50	11.00				1587
					14.90	14.90	10.75	11.95	22.00	"
		17.59	0.19	Trace.	16.00					1588
					17.78	17.78		11.20	21.30	"
16.00										
15.26	18.52									1589
								3.00	39.67	"
								11.95	12.56	1590
								50.00		"
								47.16	49.51	1591
								50.00		"
								50.00	49.30	1592
					15.00	46.64		5.45		"
		13.24	5.25		19.19	13.24				1593
								0.25	18.72	"

TABLE I.—Statement of the Results of Examining 111 Standard

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1594	Homestead Bone Black Fertilizer.	Michigan Carbon Works, Detroit, Mich.	Wm. H. Burtenshaw, Secretary-Treas., Detroit.		Guaranteed contents Standard sample ...
1595	Homestead Potato and Tobacco Fertilizer.	" " "	" " "		Guaranteed contents Standard sample....
1596	Dessicated Bone....	" " "	" " "		Guaranteed contents Standard sample....
1597	Pure Animal Bone and Potash.	" " "	" " "		Guaranteed contents Standard sample....
1598	Gregory's Special Tobacco Guano.	" " "	" " "		Guaranteed contents Standard sample....
1599	Burris' Fertilizer....	F. D. Burris, near Truro, N.S.	Manufacturer ...	Potash, nitrate of soda, dissolved bone, using plaster and black mud for a face.	Guaranteed contents Standard sample....
1600	Pure Ground Bone..	" " "	" " "		Guaranteed contents Standard sample....
1601	Genuine Peruvian Guano.	Rufus R. Gage, Importer, Hamilton, Ont.	R. R. Gage.....	Seabird excreta, etc.	Guaranteed contents Standard sample....
1602	Fertilizer.....	Joseph O'Hara, Palmerston, Ont.	Manufacturer ...	Slaughter house refuse and by-products.	Guaranteed contents Standard sample....

Samples of Commercial Fertilizers, registered for 1904—*Concluded.*

RESULTS OF ANALYSIS.										Relative value per ton of 2,000 lbs	Name of Analyst and Number of Sample.
Nitrogen.		Phosphoric Acid.					Pot- ash.	Mois- ture.			
Total in- cluding Nitric Acid and Am- monia.	Total calculat- ed as Am- monia.	Soluble in Water.	Citric Soluble.	In- sol- uble.	Total.	Total Avail- able.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
2.06	2.50				9.00	8.00	1.50				
3.45	2.97	6.71	1.60	2.43	10.74	8.31	1.60	11.80	18.58	1504 A. Lemoine.	
2.06	2.50				9.00	8.00	3.00				
2.26	2.75	5.63	2.05	1.50	9.27	7.68	4.40	12.50	19.96	1495 "	
	1.50				25.00						
1.40	1.70		7.36	15.08	22.36	7.36		3.15	15.96	1506 "	
0.82	1.00				22.00		10.00				
0.98	1.19	Trace...	11.33	12.02	23.35	11.33	8.90	2.75	27.97	1507 "	
	3.00					8.00	4.00				
3.01	3.65	11.06	0.33	1.91	13.30	11.39	4.57	15.60	26.81	1508 "	
2.12	2.58	Trace...	2.43	None.	2.43	2.43	6.70	16.40	15.21	1509 "	
4.45	5.40	None...	7.87	14.07	21.94	7.87	Trace	8.90	23.55	1600 "	
	2.75				21.00		2.40				
2.06	2.46	1.91	12.16	4.67	18.74	14.07	3.74	18.80	26.36	1601 "	
7.56	9.18	Trace...	7.68	1.50	9.27	7.68	Trace.	10.20	26.76	1602 "	

TABLE II.—Results of the Examination of 96

Date of Collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis.						
			Nitrogen.		Phosphoric Acid.				
			Total in all states.	Total stated as Ammonia.	Soluble in Water.	Citric Soluble.	Insoluble.	Total.	Available.
1904.	<i>District of Nova Scotia.</i>		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 12	Potato Phosphate, as sold.	20446	2.35	2.86	7.21	0.69	1.95	9.85	7.90
	As guaranteed			3.00				8.00	
	Standard sample (1581)		2.59	3.14	6.27	2.23	0.96	9.46	8.50
" 15	Essex Fish and Potash Fertilizer, as sold.	20451	3.19	3.83	2.18	7.49	3.52	13.19	9.67
	As guaranteed			2.50				12.00	
	Standard sample (1496)		1.51	1.83	5.63	5.05	2.56	13.24	10.68
" 15	Essex Orchard Brand, as sold.	20452	1.60	1.94	1.89	6.16	5.10	12.60	7.75
	As guaranteed			2.00				9.00	
	Standard sample (1496)		1.84	2.24	3.68	4.15	4.47	12.60	8.13
" 15	Essex Potato and Market Garden, as sold.	20453	2.38	2.89	3.02	5.87	2.99	11.98	8.89
	As guaranteed			2.00				10.00	
	Standard sample (1498)		2.10	2.55	4.47	7.23	0.77	12.47	11.70
" 15	P. dley's Bone, as sold.	20457	2.72	3.30	0.50	11.10	9.28	20.85	11.60
	As guaranteed			3.00				21.00	
	Standard sample (1521)		2.91	3.53		14.72	6.07	20.70	14.72
" 15	Bradley's Potato Fertilizer, as sold.	20458	2.18	2.65	5.47	3.29	2.48	11.24	8.76
	As guaranteed			2.00				10.00	
	Standard sample (1519)		2.10	2.55	6.20	2.89	2.23	11.32	9.09
" 15	Cumberland Ground Bone, as sold.	20459	2.30	2.79	Trace.	15.57	6.40	21.97	15.57
	As guaranteed			3.00				21.00	
	Standard sample (1527)		2.03	2.46		13.30	6.72	20.02	13.30
" 16	Stockbridge Potato Manure, as sold.	20460	3.56	4.32	3.98	1.85	1.60	7.43	5.83
" 16	Potato and Vegetables Phosphate, as sold.	20461	2.07	2.52	7.30	2.24	1.59	11.13	9.54
" 16	Swift Potato Manure, as sold.	20462	1.54	1.87	4.01	3.37	1.09	8.47	7.38
	As guaranteed			2.00				8.00	
	Standard sample (1542)		1.79	2.17	4.79	1.92	0.96	7.67	6.71
	<i>District of Nova Scotia.</i>								
April 20	Ground bone as sold.	20468	2.74	3.33	0.52	12.36	6.31	19.19	12.88
	As guaranteed			3.00				21.00	
	Standard sample (1514)		2.53	3.19		12.79	6.72	19.51	12.79
" 20	Pacific Guano Fertilizer as sold.	20469	2.16	2.62	6.12	3.46	1.77	11.35	9.58
	As guaranteed			2.50				10.00	
	Standard sample		2.10	2.55	6.52	2.43	2.36	11.32	8.96
	<i>District of P.E. Island.</i>								
" 29	Swift Lowell Animal Brand as sold.	24411	2.13	2.58	5.64	2.86	1.32	9.82	8.50
	As guaranteed			3.00				10.00	
	Standard sample (1545)		2.28	2.79	8.15	2.57	1.75	12.47	10.72
" 29	Bowlers Potato and Veg. Phosphate as sold.	24412	1.90	2.31	7.85	2.45	1.61	11.91	10.20

Samples of Fertilizers as sold in 1904.

Potash.	Moisture.	Relative value per ton of 2,000 lbs	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	¢ cts.				
Undet.	11.82	20.29	Pidgeon Fertilizer Co., Windsor, N.S.	M. Hebb, Bridgewater, N.S.	20446	Unadulterated; M. Bowman.
4.00						
4.05	14.10	21.23				
Undet.	8.98	22.80	Russell Cement Co., Gloucester, Mass.	S. C. Shaffner, Kentville, N.S.	20451	" "
2.50						
2.53	10.55	19.63				
Undet.	6.54	23.04	"	"	20452	" "
8.50						
8.19	6.00	24.04	"	"	20453	" "
Undet.	11.92	22.39	"	"		
5.00						
3.99	8.80	23.14				
Undet.	4.87	22.11	Bradley, Boston, Mass.	J. B. Chute, Berwick, N.S.	20457	" "
	5.80	24.99				
Undet.	14.44	19.72	"	"	20458	" "
3.00						
2.95	13.85	19.82				
	9.88	24.56	American Agricultural Chemical Co., Boston, Mass.	John N. Chute, Berwick.	20459	" "
	5.90	21.51				
Undet.	11.33	16.53	Bowker, Boston, Mass.	Wolfville Coal Co., Wolfville, N.S.	20460	Not registered
Undet.	15.11	17.07	"	"	20461	" "
Undet.	4.94	17.03	Lowell Fertilizer Co., Lowell, Mass.	R. E. Harris, N.S.	20462	Unadulterated
4.00						
5.04	10.90	17.17				
Undeter mined.	7.00	22.67	Pacific Guano Co., Boston Mass.	E. M. Walker, Dartmouth, N.S.	20468	" "
	6.25	22.14				
Undet.	18.28	18.85	"	"	20469	" "
1.50						
1.83	13.15	18.68				
Undet.	10.12	20.02	Swift Lowell Co., Mass.	A. Horne & Co., Charlottetown.	24411	" "
4.60						
4.13	11.08	23.37				
Undet.	15.60	17.53	Bowker Fertilizer Co. Boston.	A. Pickard & Co., Charlottetown.	24412	Not registered

TABLE II.—Results of the examination of 96

Date of collection.	Name of Sample or Brand.	No. of Sample.	Result of Analysis.					
			Nitrogen.		Phosphoric Acid.			
			Total in all states.	Total states as Ammonia.	Soluble in Water.	Citric soluble.	In- soluble.	Total.
1904.	<i>District of P. E. Island—Con.</i>		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
May 2	Blood Bone and Potash as sold.	24413	2.18	2.65	...	7.10	2.91	10.01
	As guaranteed			3.00				7.00
	Standard sample (1569)		3.43	4.16	6.40	8.75	6.07	15.22
" 3	Albert Thomas Phosphate Powder.	24414				11.96	6.10	18.11
	As guaranteed							18.00
	Standard sample (1583)					16.64	2.87	19.51
" 3	Kaimit	24415						16.64
	<i>New Brunswick District.</i>							
April 6	Reid's Superphosphate as sold.	23823	2.88	3.50	1.80	4.20	4.97	10.97
	Standard sample (1504)		3.02	3.66	3.16	2.22	5.36	10.74
" 12	Standard Grade for Grain and Vegetables as sold.	23828	1.71	2.07	7.09	2.59	1.65	11.33
" 13	Brand "XL" as sold.	23831	2.24	2.72	5.81	3.27	1.79	10.87
	As guaranteed		2.06	2.50	5.00	3.00	2.00	10.00
	Standard sample (1518)		2.13	2.58	6.20	3.40	1.91	11.51
" 16	Read's Practical Potato special as sold.	23834	1.12	1.30	1.77	2.38	1.10	5.55
	As guaranteed		0.82	1.00	2.00	2.00	1.00	5.00
	Standard sample (1523)		1.03	1.25	3.04	2.72	1.28	7.04
" 16	Bowker's Potato and Vegetables Phosphate as sold.	23835	1.65	2.01	5.08	3.54	1.66	10.28
" 18	Great Eastern General Fertilizer as sold.	23836	1.26	1.53	3.49	4.78	1.84	10.11
	As guaranteed		0.82	1.00	5.00	3.00	1.00	8.00
	Standard sample (1532)		1.30	1.58	5.88	4.16	1.28	11.32
" 20	Brand "Imperial" as sold.	23853	1.46	1.77	4.40	4.71	6.31	14.71
	As guaranteed			3.00				10.50
	Standard sample (1561)		2.52	3.06	7.22	4.70	5.95	17.87
" 20	Special Potato Phosphate as sold.	23854	1.18	1.43	2.33	4.05	7.66	11.04
	As guaranteed			2.50				8.00
	Standard sample (1560)		2.38	2.80	7.80	1.97	3.98	13.75
" 30	Lowell Actual Brand as sold.	23855	2.44	2.91	5.36	2.71	1.66	9.73
	As guaranteed			3.00				10.00
	Standard sample (1545)		2.28	2.79	8.15	2.87	1.75	12.47
	<i>District of Quebec.</i>							
" 5	Vegetable and Potato Phosphate, as sold.	24601	1.75	2.12	4.78	2.82	2.95	10.55
" 5	Bone Phosphate, as sold.	24602	0.98	1.19	4.98	3.52	1.39	9.80
" 6	" "	24603	1.40	1.70	5.60	2.66	2.78	11.04
" 6	Bowker's Potato Fertilizer (6 per cent) as sold	24604	1.15	1.40	6.00	1.95	2.27	10.22

Samples of Fertilizers as sold in 1904—Continued.

Potash.	Moisture.	Relative value per ton of 2 000 lbs.	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No of Sample.	Name and Observations of Analyst.
p. c.	p. c.	¢ cts.				
Undet.	7.34	18.54	Nova Scotia Fertilizer Co., Halifax, N.B.	A. E. Mutch & Co., Charlottetown.	24413	Unadulterated; M. Bowman.
4.00	8.00	25.04				
4.01	trace.	17.44	Wallace & Fraser, St. John, N.B.	K. T. Holman, Summerside, P.E.I.	24414	" "
Undet.	0.15	20.30				
	17.71			Brace & McKay, Summerside.	24415	Not registered "
Undet.	25.62	15.75	Thomas Reid, Parish of Simonds, St. John Co., N.B.	Thomas Reid, Parish of Simonds, St. John Co., N.B.	23821	Unadulterated, M. Bowman.
2.28	27.46	18.07				
Undet.	12.38	16.27	E. Frank Co., New York, U.S.A.	S. B. Hunter, Harvey Station, York County, N.B.	23828	Not registered "
Undet.	13.62	18.38	Bradley Fertilizer Co., Boston, Mass., U.S.A.	Henry E. Hill & Co., King Street, St. Stephen, Charlotte Co., N.B.	23831	Unadulterated "
1.50	13.45	19.00				
1.75						
Undet.	10.52	16.70	The American Agricultural Chemical Co., New York, U.S.A.	J. F. Theriault, Grand Falls, Victoria Co., N.B.	23834	" "
8.00						
8.70	9.16	18.81				
Undet.	14.57	14.76	Bowker Fertilizer Co., Boston and New York, U.S.A.	A. R. Hallett, Grand Falls, Victoria Co., N.B.	23835	Not registered "
Undet.	11.16	17.45	The American Agricultural Chemical Co., New York, U.S.A.	Solomon Perley, Woodstock, Carleton Co., B.C.	23836	Unadulterated "
4.00	8.75	20.13				
4.53	13.06	17.71	Provincial Chemical Fertilizer Co., Ltd., St. John, N.B.	Sumner Co., Moncton, Westmoreland Co., N.B.	23853	Adulterated, being deficient in ammonia and phosphoric acid, M. Bowman.
1.50	8.60	23.57				
1.35	19.61	19.41	"	"	23854	Adulterated, being deficient in ammonia, M. Bowman.
Undet.						
6.50	7.10	24.48				
5.33	11.94	20.44	Swift Lowell Fertilizer Co., Boston, Mass., U.S.A.	Charles Elliot, Moncton, Westmoreland Co., N.B.	23855	Unadulterated "
Undet.						
4.00	11.08	28.38				
4.13						
1.80	11.08	15.35	Bowker Fertilizer Co., Boston.	John Leith, Rectory Hill, Megantic.	24601	Dr. J. T. Donald, not registered.
2.27	10.54	14.37	"	"	24602	" "
1.86	15.58	16.06	"	E. Hebert, Tingwick, Athabaska Co.	24603	" "
4.45	14.87	17.68	"	J. McMurray, Windsor Mills, P.Q.	24604	" "

TABLE II. Results of the Examination of 96 Samples

RESULT OF ANALYSIS.									
Date of Collection.	Name of Sample or Brand.	No. of Sample.	Nitrogen.		Phosphoric Acid.				
			Total, in all states.	Total stated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Available.
1904.	<i>District of Quebec—Con.</i>		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 7	Bowker's Potato Fertilizer (6 per cent) as sold.	24603	1.15	1.40	4.51	2.91	2.07	9.49	7.42
" 7	Superphosphate with Potash, as sold.	24606	0.17	0.21	7.67	3.06	2.80	13.13	10.73
" 7	Bone Phosphate, as sold.	24607	1.19	1.44	4.40	3.15	2.58	10.11	7.85
" 7	Square Brand, Bone and Potash, as sold.	24608	1.54	1.87	4.84	2.39	2.35	9.58	7.23
" 7	Bone Phosphate, as sold.	24609	1.08	1.31	6.58	1.93	1.57	10.08	8.51
April 7	Superphosphate with Potash.	24610	0.21	0.25	7.60	2.33	2.70	12.63	9.93
" 8	Victor Fertilizer as sold.	24611	3.01	3.65	2.68	1.33	4.68	8.69	4.01
	As guaranteed.			2.00					7.00
	Standard Sample (1508).		1.06	2.38	4.15	2.89	2.36	9.40	7.04
" 8	Bowker's Vermont Fertilizer as sold.	24612	1.75	2.13	6.65	2.70	2.03	11.38	9.35
" 15	Victor complete Fertilizer as sold.	24613	2.48	3.01	2.81	0.81	5.20	8.82	3.82
	As guaranteed.			2.00					7.00
	Standard Sample		1.96	2.38	4.15	2.89	2.36	9.40	7.04
" 16	Celery and Early Vegetable Manure as sold.	24614	2.94	3.57	5.72	4.16	4.40	14.28	9.88
	As guaranteed.			6.00				9.00	
	Standard Sample (1552).		5.29	6.42	4.99	3.52	2.83	12.34	8.51
" 16	Sure Growth Manure as sold.	24615	2.41	2.93	6.44	3.35	5.33	15.12	9.70
	As guaranteed.			3.50				8.00	
	Standard Sample (1550).		2.94	3.57	5.75	3.63	6.39	15.67	9.28
" 18	Phosphate Fertilizer as sold.	24617	0.07	0.08	9.39	3.83	4.78	18.00	13.22
	As guaranteed.							15.00	
	Standard Sample (1553).				9.59	4.29	4.03	17.91	13.88
" 18	Reliance Fertilizer as sold.	24616	2.10	2.55	3.25	0.68	4.74	8.67	3.93
	As guaranteed.			2.00					6.00
	Standard Sample (1506).		1.68	2.04	6.84	1.35	4.60	12.79	8.19
	<i>Montreal District.</i>								
" 7.	Tankage Fertilizer as sold.	25125	7.70	9.35	0.73	8.45	2.04	11.22	9.18
	As guaranteed.		6.23	7.56				13.31	
	Standard sample (1500).		6.78	8.22		10.88	2.39	13.27	10.88
" 7.	Tankage Fertilizer as guaranteed.	25126	8.82	10.71	0.45	6.41	2.23	9.09	6.86
" 7.	Standard Fertilizer as sold.	25127	2.97	3.61	7.83	1.34	3.27	12.44	9.17
	As guaranteed.			2.50				11.00	9.00
	Standard sample (1536).		2.52	3.06	7.16	1.15	3.65	11.96	8.31
" 7.	Bone and Potash as sold.	25128	2.66	3.23	6.39	3.28	4.79	14.46	9.67
	As guaranteed.			2.00				9.00	
	Standard sample (1551).		2.24	2.72	6.07	3.21	5.11	14.39	9.28
" 7.	Celery and Early Vegetable as sold.	25129	2.94	3.57	6.49	3.42	5.03	14.94	9.91
	As guaranteed.			6.00				9.00	
	Standard sample (1552).		5.29	6.42	4.99	3.52	2.83	12.34	8.51

of Fertilizers as sold in 1904—Continued.

Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	\$ cts.				
5.37	12.52	17.85	Bowker Fertilizer Co., Boston.	D. Watson, Oak Hill Road, Kingsbury..	24605	Dr. J. T. Donald; not registered.
2.34	13.06	16.20	" ..	" ..	24606	" ..
2.15	13.66	14.84	" ..	" ..	24607	" ..
2.18	15.32	15.40	" ..	" ..	24608	" ..
2.08	17.66	15.46	" ..	N. Darby, 1st Road of Racine, Ely, P.Q.	24609	" ..
2.37	13.85	15.51	" ..	N. Darby, 1st Road Racine, Ely.	24610	" ..
3.56	10.76	17.62	The Nichols Chemical Co., Capleton.	O. C. Selby, Dunham, Missisquoi.	24611	Dr. J. T. Donald; above guarantee in ammonia and potash, but deficient in available phosphoric acid.
4.49	9.75	18.65				
4.26	14.92	20.57	Bowker Boston.	N. Maynard, Dunham	24612	Dr. J. T. Donald; not registered.
4.06	11.82	16.51	Nichols Chemical Co., Capleton, Que.	S. Vessot, & Co., Joliette, P. Q.	24613	Dr. J. T. Donald; deficient in available phosphoric and above guarantee in ammonia and potash.
3.00	.....	.....		
4.49	9.75	18.61				
4.47	17.01	25.06	W. A. Freeman, Hamilton, Ont.	Eug. Julien, St. Malo de Quebec.	24614	Dr. J. T. Donald; below guarantee in ammonia and potash but far above in phosphoric acid.
6.00	.....	.....		
7.64	8.80	32.76	" ..	" ..	24615	Dr. J. J. Donald; below guarantee in potash but far above guarantee in phosphoric acid.
1.88	16.14	21.22	" ..	" ..	24616	Dr. J. T. Donald; above guarantee in ammonia and potash.
3.00	.....	.....		
3.07	11.75	23.65	" ..	" ..	24617	Dr. J. T. Donald; above guarantee in ammonia and potash.
0.01	9.22	17.20	" ..	" ..	24618	Dr. J. T. Donald; above guarantee in ammonia and potash.
.....	6.65	19.36				
1.99	10.59	13.60	Nichols Chemical Co., Capleton, Que.	P. T. Legaré, Quebec	24619	Dr. J. T. Donald; below guarantee in available phosphoric acid.
3.76	10.15	19.36				
0.19	10.11	30.99	Vendors.	Laing Packing and Prov. Co., Mill St., Montreal	25125	Dr. J. T. Donald; above guarantee in ammonia, but below guarantee in phosphoric acid.
.....	11.24	28.95				
0.32	9.56	31.51	Vendors.	Montreal Stock Yards Co., Mill St., Montreal.	25126	Dr. J. T. Donald; not registered.
2.44	13.43	22.13	Standard Chem. Co., Smith's Falls, Ont.	Brodie & Harvie, Bleury St., Montreal.	25127	Dr. J. T. Donald; above guarantee.
2.00	.....	.....		
2.08	8.80	19.67				
3.12	14.52	22.87	W. A. Freeman & Co., Hamilton, Ont.	Wm. Ewing & Co., McGill St., Montreal.	25128	Dr. J. T. Donald; above guarantee in ammonia and phosphoric acid; below guarantee in potash.
6.00	.....	.....		
6.95	9.70	25.45	" ..	" ..	25129	Dr. J. T. Donald; above guarantee in phosphoric acid; below guarantee in ammonia and potash.
2.47	17.21	23.27	" ..	" ..	25130	Dr. J. T. Donald; above guarantee in phosphoric acid; below guarantee in ammonia and potash.
6.00	.....	.....		
7.61	8.80	32.76				

TABLE II.—Results of the Examination of 96

Date of Collection.	Name of Sample or Brand.	No. of Sample.	RESULT OF ANALYSIS.						
			Nitrogen.		Phosphoric Acid.				
			Total in all States.	Total stated as Ammonia.	Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Avail- able.
1904.	Montreal District—Con.		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 7	Potato Manure as sold	25130	2.59	3.14	5.79	3.21	4.26	13.96	9.70
	As guaranteed			3.00				8.00	
	Standard sample (1554)		2.64	3.21	6.23	2.08	5.28	13.59	8.31
" 7	Sure Growth as sold	25131	3.01	3.65	5.17	4.36	3.51	13.04	9.53
	As guaranteed			3.5				8.00	
	Standard sample (1550)		2.94	3.57	5.75	3.53	6.39	15.67	9.28
May 11	Special Fertilizer as sold	25136	3.11	3.88	8.04	0.15	3.08	11.27	8.19
	As guaranteed			3.50				10.00	8.00
	Standard sample (1535)		3.15	3.82	7.35	0.78	2.75	10.88	8.13
" 10	Corn Phosphate as sold	25137	1.40	1.70	6.43	1.88	1.14	9.45	8.31
" 10	Vermont Phosphate as sold	25138	1.96	2.38	6.93	1.05	1.68	9.66	7.98
" 10	Victor Fertilizer as sold	25139	0.98	1.19	4.78	0.96	4.43	10.17	5.74
	As guaranteed			2.00				7.00	
	Standard sample (1506)		1.96	2.38	4.15	2.89	2.36	9.40	7.04
April 20	Fertilizer No. 1, as sold	25132	1.85	2.25	7.64	0.99	3.43	12.06	8.63
	As guaranteed			2.00				11.00	9.00
	Standard sample (1538)		1.78	2.16	6.40	1.06	4.48	11.96	7.48
" 20	Star Fertilizer, as sold	25133	1.85	2.25	3.91	0.22	4.73	8.88	
	As guaranteed			2.00				6.00	5.00
	Standard sample (1537)		1.82	2.21	4.15	0.58	1.67	6.40	4.73
" 20	Superphosphate of Lime, as sold	25134	0.21	0.25	8.26	2.20	4.04	14.50	
	As guaranteed							16.00	14.00
	Standard sample (1534)		0.14	0.17	10.04	1.99	4.60	16.63	12.03
" 20	Bradley's Eclipse, as sold	25135	1.40	1.70	6.41	2.12	2.06	10.59	8.53
	As guaranteed		1.03	1.25	6.00	2.00	2.00	10.00	8.00
	Standard sample (1517)		1.26	1.53	6.52	2.57	2.55	11.64	9.09
<i>Kingston District.</i>									
" 26	"Victor," as sold	25140	1.74	2.12	3.81	1.37	4.72	9.80	5.08
	As guaranteed			2.00					7.00
	Standard sample (1506)		1.96	2.38	4.15	2.89	2.36	9.40	7.04
" 26	Corn Special, as sold	25141	1.95	2.37	4.46	1.23	4.34	10.03	5.69
" 26	No. 1 Fertilizer, as sold	25142	1.19	1.45	7.41	1.91	4.08	13.40	9.32
	As guaranteed			2.00				11.00	9.00
	Standard sample (1538)		1.78	2.16	6.40	1.06	4.48	11.96	7.48
" 26	Royal Canadian, as sold	25143	2.76	3.36	6.26	2.25	4.26	12.77	8.53
	As guaranteed			4.00					9.00
	Standard sample (1507)		2.80	3.40	7.16	1.48	3.96	12.60	8.64
" 26	Corn Special, as sold	25144	2.03	2.47	3.16	1.39	4.34	8.89	4.55
April 28	New Method, as sold	25145	1.17	1.42	5.65	1.50	2.81	9.96	7.15
	As guaranteed		1.03	1.25	6.00	2.00	2.00	10.00	8.00
	Standard sample (1520)		1.06	1.31	7.84	2.24	2.39	12.47	10.08
" 28	B. D. Seafowl Guano, as sold	25146	1.52	1.85	4.29	4.88	3.07	12.24	9.17
	As guaranteed		2.06	2.50	6.00	2.00	1.00	9.00	8.00
	Standard sample (1573)		2.10	2.55	6.85	1.01	3.33	11.19	7.86
" 28	Lawn Fertilizer, as sold	25147	1.36	1.66	8.36	1.45	2.27	12.08	9.81

Samples of Fertilizers as sold in 1904—Continued.

Potash.	Moisture.	Relative value per ton of 2,000 lbs	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	\$ cts.				
3.42	17.09	23 83	W. A. Freeman & Co., Hamilton, Ont.	Wm. Ewing & Co., McGill St., Montreal.	25130	Dr. J. T. Donald; according to guarantee.
5.00						
5.79	10.20	24 26	" ..	" ..	25131	Dr. J. T. Donald; according to guaranteed value.
2.19	15.92	22 15				
3.00						
11.07	11.75	23 55	Standard Chemical Fertilizer Co., Smith's Falls, Ont.	Brodie & Harvey, Bleury St., Montreal.	25136	Dr. J. T. Donald; as guaranteed.
11.88	11.38	26 00	Bowker Fertilizer Co.	J. McCause, Hemmingford, Que.	25137	Dr. J. T. Donald; not registered.
6.00	8.55	26 03				
7.00	20.09	16 13	" ..	" ..	25138	Dr. J. T. Donald; "deficient in available phosphoric acid."
2.27	14.61	19 33	Nichols Chemical Co.	Keddy & Kenny, Hemmingford, Que.	25139	Dr. J. T. Donald; above guarantee.
4.08	17.04	14 59				
2.77	9.75	18 65	Standard Chemical Fertilizer Co., Smith Falls, Ont.	Greeley Bros. & Thompson, Sutton, P.Q.	25132	Dr. J. T. Donald; according to guarantee.
11.00	16.04	17 73	" ..	" ..	25133	Dr. J. T. Donald; according to guarantee.
4.49	9.40	16 54				
1.25	8.17	13 02				
1.64	3.85	12 56				
1.80	12.17	14 38	" ..	" ..	25134	Dr. J. T. Donald; below guarantee.
11.00						
0.29	10.75	15 96	Am. Agricultural Chemical Co. (Bradley).	J. W. Murphy, Sutton, P.Q.	25135	Dr. J. T. Donald; according to guarantee.
	16.23	16 56				
2.29	10.65	17 05				
2.00						
2.27						
3.18	13.73	15 22	Nichols Chemical Co., Capelton, P.Q.	N. Willard & Co., Prescott, Ont.	25140	Dr. W. H. Ellis; unadulterated.
3.00						
4.49	9.75	18 65	" ..	" ..	25141	Dr. W. H. Ellis; not registered.
3.80	13.77	17 06				
1.47	13.70	16 84	Standard Chemical and Fertilizer Co.	Arthur Templeton, Oxford Mill, Ont.	25142	Dr. W. H. Ellis; unadulterated.
1.25	9.40	16 54	Nichols Chemical Co.	" ..	25143	Dr. W. H. Ellis; unadulterated.
1.64	11.35	22 40				
3.88						
5.00	9.40	26 68	" ..	H. Brown & Son, Brockville, Ont.	25144	Dr. W. H. Ellis; not registered.
6.68	13.74	14 50	American Agricultural Chemical Co. from stock of fall, 1903.	H. Brown & Sons, Brockville, Ont.	25145	D. W. H. Ellis, Unadulterated.
2.50	9.70	14 58				
2.16						
2.00	9.52	20 10	" ..	" ..	25146	" ..
4.51	1.10	16 78				
1.34						
1.50						
1.52	9.80	17 37	W. A. Freeman Co., Hamilton.	Hay, Flour and Seed Co., Brockville.	25147	" .. not registered.
2.47	17.90	18.42				

TABLE II.—Results of the Examination of 96

Date of Collection.	Name of Sample or Brand.	No. of Sample.	RESULT OF ANALYSIS.						
			Nitrogen.		Phosphoric Acid.				
			Total in all states.	Total stated as Am- monia.	Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Avail- able.
1904.	<i>Toronto District.</i>		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
April 13	Complete manure, as sold..	25148	3 64	4 42	4 82	4 32	2 39	11 53	9 14
	As guaranteed								
	Standard sample (1519)...								
" 13	Potato Fertilizer, as sold..	25149	3 01	3 66	5 81	2 51	1 85	10 17	8 32
	As guaranteed		2 06	2 50	5 00	3 00	2 00	10 00	8 00
	Standard sample (1519)...		2 10	2 55	6 20	2 89	2 23	11 32	9 09
" 13	B. D. Seafowl Guano, as sold.	25150	2 25	2 73	5 74	2 90	2 15	10 79	8 64
	As guaranteed		2 06	2 50	6 00	2 00	1 00	9 00	8 00
	Standard sample (1573)...		2 10	2 55	6 85	1 01	3 33	11 19	7 86
" 13	Sure Growth, as Manure sold.	25151	2 76	3 36	5 36	3 04	5 76	14 16	8 40
	As guaranteed			3 50				8 00	
	Standard sample (1550)...		2 94	3 57	5 75	3 53	6 39	15 67	9 28
" 13	Potato Manure, as sold...	25152	2 39	2 91	5 75	3 11	5 67	14 53	8 86
	As guaranteed			3 00				8 00	
	Standard sample (1554)...		2 64	3 21	6 23	2 08	5 28	13 59	8 31
" 14	Seafowl Guano, as sold...	25153	2 39	2 91	6 50	2 85	1 89	10 24	8 35
	As guaranteed		2 06	2 50	6 00	2 00	1 00	9 00	8 00
	Standard sample (1573)...		2 10	2 55	6 85	1 01	3 33	11 19	7 86
" 14	Complete Manure, as sold.	25154	2 92	3 55	5 25	1 56	2 84	9 65	6 81
	As guaranteed		3 29	4 00	6 00	2 00	1 00	9 00	8 00
	Standard sample (1574)...		3 36	4 08	6 09	2 74	3 00	11 83	8 83
" 14	New Method Fertilizer, as sold.	25155	2 07	2 52	5 79	2 77	1 90	10 46	8 56
	As guaranteed		0 82	1 00	6 00	2 00	1 00	9 00	8 00
	Standard sample (1572)...		0 91	1 10	6 85	0 69	3 65	11 19	7 54
" 15	Celery and Vegetable Ma- nure, as sold.	25156	2 85	3 47	6 00	2 98	4 36	13 34	8 96
	As guaranteed			6 00				9 00	
	Standard sample (1552)...		5 29	6 42	4 99	3 52	3 83	12 34	8 51
" 15	Tankage, A Brand, as sold.	25157	11 47	13 92	0 18	2 44	0 98	3 60	2 62
	As guaranteed		9 13	11 08				5 86	
	Standard sample (1501)...		9 60	11 66		4 64	1 43	6 07	4 64
" 15	Bone Meal, as sold	25158	3 23	3 93		15 98	9 66	25 64	15 96
	As guaranteed			3 00				23 00	
	Standard sample (1557)...		2 43	4 16		15 51	9 75	25 26	15 51
" 15	Potato Manure, as sold...	25159	2 85	3 47	5 60	3 04	5 91	14 55	8 64
	As guaranteed			3 00				8 00	
	Standard sample (1554)...		2 64	3 21	6 23	2 08	5 28	13 59	8 31
	<i>London District.</i>								
" 5	Fertilizer.	22207	4 12	5 00	4 15	2 73	4 03	10 91	
" 5	Agricultural Fertilizer	22208	3 40	4 13	4 02	3 12	4 10	11 24	
" 6	Thomas Phosphate, as sold.	22210				14 30	3 70	17 90	
	As guaranteed							18 00	
	Standard sample (1583)...					16 64	2 87	19 51	16 64
" 6	Bradley Fertilizer, as sold.	22215	3 08	3 74		14 73	7 01	21 74	

Samples of Fertilizers as sold in 1904—Continued.

Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Manufacturer or Furnisher as given by Vendor.	Name and Address of Vendor.	No. of Sample.	Name and Observations of Analyst.
p. c.	p. c.	¢ cts.				
7.58	11.22	28.66	American Agricultural Company.	Tettersington Bros., St. Catharines, Ont.	25148	Dr. W. H. Ellis; not registered
2.92	13.35	21.16	" "	" "	25149	" unadulterated.
3.00	13.85	19.82	" "	" "	25150	" "
1.96	12.80	15.60	" "	" "	25151	" "
1.50						
1.52	9.80	17.37	W. A. Freeman Co., Hamilton, Ont.	R. R. Gage, G. T. R. Depot, St. Catharines, Ont.	25151	" "
2.67	17.45	21.46	" "	" "	25152	" below guarantee in potash.
3.00	11.75	23.55	" "	" "	25153	" unadulterated.
3.07	16.06	21.17	Bradley Fertilizer Co.	R. Cooper, Welland, Ont.	25154	" "
1.80	10.20	24.26	" "	" "	25155	" "
5.10	13.42	18.45	" "	" "	25156	" "
5.79	9.80	17.37	" "	" "	25157	" "
1.86	6.82	23.44	" "	" "	25158	" "
1.50	8.75	27.72	" "	" "	25159	" "
1.52	10.86	22.82	" "	" "	25160	" "
6.66						
7.00	11.30	15.92	W. A. Freeman Co., Hamilton, Ont.	M. Taylor, Barrie, Ont.	25161	Dr. W. H. Ellis, adulterated being under guarantee in ammonia and potash.
7.33	16.01	23.74	" "	" "	25162	" "
7.27	8.80	32.76	Harris Abbatoir Co.	W. Rennie, Jarvis St., Toronto.	25163	Dr. W. H. Ellis, unadulterated.
2.00	6.13	30.70	" "	" "	25164	" "
3.34	5.84	28.56	W. A. Freeman Co., Hamilton, Ont.	J. A. Simmers, King St., East Toronto.	25165	" "
4.35	5.20	28.21	" "	" "	25166	" "
6.00	5.96	28.56	" "	" "	25167	" "
7.64	16.32	22.52	" "	" "	25168	" "
0.00	10.20	24.25	" "	" "	25169	" "
6.66	6.53	26.88	" "	George J. Thorp, Seed Merchant, Guelph.	22207	Prof. E. B. Kenrick, insufficiently described.
1.00	7.40	20.31	V. Evans & Co., Seed Merchant, Hamilton.	" "	22208	" "
	0.44	18.21	Canadian Agt., J. Thomas, Phosphate	Isiah Holman, Miller, Berlin.	22210	Prof. E. B. Kenrick, genuine.
	30.30					
	5.63	25.67	Bradley Co., Rochester and Boston.	W. R. Marshall, Seed Merchant, Stratford.	22215	" insufficiently described.

TABLE II.—Results of the Examination of 96

Date of collection.	Name of Sample. or Brand.	No. of Sample.	RESULT OF ANALYSIS.						
			Nitrogen.		Phosphoric Acid.				
			Total in all States.	Total stated as Ammonia.	Soluble in Water.	Citric Soluble.	In- soluble.	Total.	Avail- able.
1904.	<i>District of London—Cod.</i>		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
"	8 Bone Meal, as sold.....	22218	1.54	1.87	.....	16.83	10.72	27.55	.....
	As guaranteed.....			1.50	.....			25.00	.....
	Standard sample (1596).....		1.40	1.70	.....	7.36	15.03	22.39	7.36
"	8 Ground Bone Fertilizer....	22220	1.38	1.68	.....	17.33	12.02	29.35	.....
	As guaranteed.....			1.50	.....			25.00	.....
	Standard sample (1596).....		1.40	1.70	.....	7.36	15.03	22.39	7.36
"	11 Blood Meal Fertilizer.....	22225	11.24	14.38	.....				.....
April 12	Potato Fertilizer.....	22228	2.11	2.56	4.96	3.33	2.42	10.70	.....
	As guaranteed.....			2.10	5.00	3.00	2.00	10.00	.....
	Standard sample (1519).....		2.10	2.55	6.20	2.89	2.23	11.32	9.09
"	12 Ingersoll Fertilizer, as sold	22229	6.76	8.21	.....	12.07	4.21	16.28	.....
	As guaranteed.....			9.00	.....	5.50	6.80	12.30	.....
	Standard sample (1549).....		7.00	8.50	Trace.	9.31	0.60	9.91	9.31
"	12 Fertilizer.....	22230	5.09	6.18	.....	4.63	2.40	6.93	.....
	<i>British Columbia District.</i>								
"	15 Fertilizer A, as sold. . .	24937	3.99	4.70	9.80	0.10	0.10	10.00	.....
	As guaranteed.....		4.00	4.86	.....			10.00	.....
	Standard sample (1585).....		3.78	4.59	11.51	1.15	Trace.	12.66	12.66
"	13 Fertilizer B, as sold. . .	24938	2.92	3.55	9.20	0.30	0.10	9.60	.....
	As guaranteed.....		3.50	4.25	.....			9.00	.....
	Standard sample (1586).....		3.57	4.33	10.74	0.77	Trace.	11.51	11.51
"	13 Fertilizer C, as sold. . .	24939	0.56	0.71	12.40	0.50	0.10	13.00	.....
	As guaranteed.....				.....			12.50	.....
	Standard sample (1587).....		Trace.	.....	13.30	1.60	Trace.	14.90	14.90
"	13 Superphosphate, as sold...	24340	0.70	0.84	15.50	0.00	0.10	15.60	.....
	As guaranteed.....				.....			16.00	.....
	Standard sample (1598).....				17.59	0.19	Trace.	17.78	17.78
"	13 Sulphate of Potash.....	24041			.....				.....
	As guaranteed.....				.....				.....
	Standard sample (1591).....				.....				.....
"	20 Muriate of Potash, as sold.	24942			.....				.....
	As guaranteed.....				.....				.....
	Standard sample (1592).....				.....				.....
"	20 Nitrate of Soda, as sold....	24954	15.50	18.80	.....				.....
	As guaranteed.....		16.00	19.43	.....				.....
	Standard sample (1589).....		15.26	18.52	.....				.....
"	20 Nitrate of Soda, as sold....	24943	15.90	19.30	.....				.....

Samples of Fertilizers as sold in 1904—*Concluded.*

Potash.	Moisture.	Relative value per ton of 2,000 lbs.	Manufacturer or furnisher as given by vendor.	Name and Address of Vendor.	No. of sample.	Name and Observations of Analyst.
p. c.	p. c.					
.....	3.57	25.41	Michigan Carbon Works, Detroit.	Darch & Hunter, Seed Merchants, London.	22218	Prof. E. B. Kenrick, genuine.
.....	3.15	15.95				
.....	3.91	25.97	Michigan Carbon Co., Detroit.	Percome & Donaldson, Seed Merchants, Strathroy.	22220	" "
.....	3.15	15.95				
.....	7.45	28.42	W. A. Freeman, Hamilton, Blood Meal Fertilizer.	Patrick Brothers, Seed, Flower and Feed Merchants, Woodstock.	22225	Prof. E. B. Kenrick; insufficiently described.
3.17	11.42	19.12	Bradley Fertilizer Co., Buffalo and New York.	Robertson & McKay, Hardware Merchants, Ingersoll.	22228	Prof. E. B. Kenrick; genuine.
3.00	13.85	19.82				
2.95	6.65	30.75	Ingersoll Packing Co., Ingersoll.	Ingersoll Packing Co., Ingersoll.	22229	" "
.....	12.50	27.22				
.....	3.94	18.03	London Soap Co., London.	London Soap Co., London.	22230	Prof. E. B. Kenrick; insufficiently described.
8.80	17.20	31.51	Victoria Chemical Co., Victoria.	Victoria Chemical Co., Victoria.	24937	Dr. C. J. Fagan; genuine.
7.00	11.80	32.28				
7.04	14.00	32.43	" "	" "	24938	" "
12.80	12.00	34.28				
11.00	13.70	30.29	" "	" "	24939	" "
10.75	11.85	29.00				
12.70	17.70	20.45	" "	" "	24940	" "
11.00	11.20	21.30				
10.75	11.20	21.30				
.....	52.50		Bogardus & Co., Seattle, U.S.	M. J. Henry, Vancouver.	24941	" "
50.00	2.30	49.51				
47.16	.....	53.34	" "	" "	24942	" "
50.80	5.45	49.30				
50.00	2.10	40.30	Victoria Chemical Co., Victoria, B.C.	J. Brown & Sons, Vancouver.	24954	" "
46.64	3.00	39.67				
.....	1.50	40.34	Bogardus & Co., Seattle, U.S.	M. J. Henry, Vancouver, B.C.	24943	" "

MEMORANDA ON MANURES.

Since this publication is intended for circulation among our farmers, it has been thought advisable to take advantage of its issue by reprinting some of the notes which have appeared in former bulletins, and adding a few additional particulars from works which have recently appeared, regarding the application of natural manures and artificial fertilizers.

It is about fifty years since Stoeckhardt, at that time professor in the agricultural school of Tharandt, Saxony, said that a farmer who bought guano, bonemeal, or other artificial fertilizers, and at the same time neglected to make proper use of the dung of the cattle on his own farm, must be regarded as an agricultural spendthrift. Every intelligent farmer in Canada will in these modern days agree with the old German professor, and maintain that the treasury of the farm is the dungstead, and that leaks and emanations from it of valuable fertilizing constituents must lead to financial embarrassment and possibly ruin.

This statement may be positively made without in the slightest degree detracting from the merits of artificial fertilizers, for when properly selected and applied, their value becomes abundantly evident. The question as to whether their use is remunerative has been frequently discussed, and depends to a large extent on the care employed in their selection. Supposing that the intelligent farmer has considered composition, cost, &c., to the best of his ability, made his selection and applied the fertilizer, he may still be in doubt as regards the result unless he takes steps to make a manure trial with it. As regards the best way of doing this, Hellriegel, in a publication, dated 1897, has related his experience. He recognizes how difficult it is for practical agriculturists, fully occupied with their regular work, and engaged in meeting all the difficulties caused by workmen, weather and market rates, to carry out regularly planned manure experiments. He therefore describes a method, which experience in his estimation had justified, and recommends it for the purpose of ascertaining whether any application of lime, marl, dung or fertilizers had really produced the improvement which from the point of view of cost had been expected. This plan is to pass over, at one or several places, properly selected, a few square rods of the field without applying the dung or fertilizer. In this way unmanured plots, which do not require to be measured with great exactitude, but merely paced, and do not need to be harvested separately, are left in the manured field, by means of which any improvement in the latter may be remarked and valued.

This plan exacts that it should be possible to see a distinct difference between the unmanured plots and the manured field, not only as regards the height and density of the resulting crop, but also in reference to the fullness of the ears and the development of the grains. In the event of such a distinct difference being invisible the manure is justly discredited as unfit for its intended purpose. It would seem advisable to recommend this plan to farmers who use fertilizers, because some of them may manure the whole field, fail to see any improvement on account of being unable to make comparisons, and perhaps condemn the fertilizer unjustly. The simplicity of the plan above described, and its applicability everywhere and every year would appear to commend it to the practical agriculturist. At the same time it is necessary to remark that there are instances on record of fertilizers having been applied and remaining utterly without effect owing to some defect in the soil. Such defects have often been cured by a previous application of marl or lime, which not only produced good effects themselves, but improved also the action of the fertilizers afterwards applied.

THE CARE OF NITROGEN.

This element is the most valuable of fertilizing constituents, and one which is exceedingly liable to loss.

In many of the fertilizers described in this and former reports their cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms, and this stock might even be increased by cultivating those crops which have the power of appropriating the

nitrogen of the atmosphere. Nevertheless the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. In the case of the mixed fertilizers, this extra charge varies from \$8 to \$14 per ton, which the farmer must pay if he purchases, and which he can readily save in his own stables or produce upon his own farm.

Among the standard samples described in the present report for 1904 there are some whose guarantee in ammonia is placed at 1.50 p.c. and even at 1.00. Less than 1.50 p.c. of this ingredient is too small a quantity where its application is required, and where not needed it is useless to apply it. It is, as a rule, cheaper to purchase fertilizers containing large percentages of the fertilizing ingredients and apply a lesser quantity per acre.

Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals, and one-half of it is contained in the urine. It is further well known that 95 per cent of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only. It has, however, been ascertained that stable-yard manure experiences considerable loss of its fertilizing constituents, but more especially of nitrogen, when left to itself in the dung heap. According to the experiments of Wolff, this loss amounts to 55 per cent of the nitrogen contained in fresh manure from horned cattle. The later experiments of Heiden and Holdeleiss place it at 23.4 per cent. These results were obtained when ordinary reasonable care is taken of the manure, but give no data for estimating the loss which occurs when, as is very frequently the case in Canada, the manure is treated with the grossest neglect. It is safe to assume that, generally, 50 per cent of the nitrogen contained in the barn-yard manure of this country returns unutilized to the atmosphere, or is otherwise lost by careless treatment. Supposing that an average quantity of 36,000 pounds is produced in fresh condition annually by each animal, and that it contains 0.4 per cent of nitrogen it follows that a loss of 72 pounds of nitrogen, worth \$8.64, takes place for each head of cattle. This loss can be prevented by daily strewing the stables with two pounds of ground plaster for each animal, which at once prevents any smell of ammonia from arising in the stable. The quantity prescribed means 700 lbs. or a cost of about \$2.50 annually for each 1,000 lbs live weight, but by adopting this plan, the farmer would to a great extent be relieved from the necessity of purchasing the nitrogen of artificial fertilizers.

In a pamphlet published by Vieweg, 1859, entitled *Ein Pfund Stickstoff kaum einen Groschen*, which may be freely translated 'A pound of nitrogen for a penny,' Dr. Meyer-Altenberg maintained that ground gypsum is the very best preservative of barn-yard manure when applied in the stable, because it secures 'certainty and completeness of effect, ease of execution, and the lowest possible cost.' He further described the effect of its application on the domain of Beberbeck in Hesse, and other impoverished farms, showing that it is possible to bring such into a fertile condition without the purchase of manure or fertilizers or feeding stuffs, excepting a little straw for bedding and oats for the horses.

TREATMENT OF STABLE-YARD MANURE.

Dr. Meyer-Altenberg, in the little work above mentioned, takes care to point out, that the use of gypsum, without subsequent careful treatment of the dunghoops, does not give the desired effect, and he dwells on the importance of having the manure thoroughly trodden down, and made as compact as possible. This is also shown in Dr. J. Koenig's prize essay, 'How can the farmer preserve and increase the stock of nitrogen on his property?' (Berlin, 1887.) In a special chapter of this work the author discusses 'The evolution of free nitrogen during the fermentation and storage of stable manure, describes the experiments which were made from 1860 to 1885 regarding its treatment, and gives, finally, the results of the discussion from which the following sentences may be translated with advantage:—

1. In the decomposition of nitrogenous substances of every nature a loss, more or less considerable, of free nitrogen takes place.
2. This loss is the greater the more the atmosphere has access to the decomposing

3. Too much moisture is just as hurtful as too little. Stable manure requires such a degree of humidity as permits its components to lie close to each other.

4. The addition of substances which fix ammonia (such as gypsum, kainite and kieserite) prevent or reduce the loss of nitrogen. *These substances are, however, of little or no value if care is not taken at the same time to prevent as much as possible the access of air.*

12. In storing stable manure in dungsteads the latter must be watertight and roofed in, and the treading down of their contents by the farm animals is to be recommended.

In a recent bulletin (No. 63) of the Pennsylvania State College Agricultural Experiment station (1903) some important experiments on steer-feeding are described which confirm some of the foregoing results. The following quotations are of interest :— 'The trampled manure suffered little loss of fertilizing constituents, though less than two-fifths of the dry matter of food and litter was recovered in the manure.' 'The untrampled manure suffered more extensive losses of organic matter and nitrogen than the trampled manure, owing chiefly to the more complete exclusion of air in the latter case.'

One thing in connection with this question is perfectly certain and that is that the use of gypsum, or ordinary ground land plaster, prevents any loss of nitrogen in the stable, and while the manure is being forwarded to the dungheap. Further if the work from which the foregoing quotations have been made be carefully studied, and also the experiments and writings of Holdreiss, Vogel and others, it appears to be quite certain that the use of the same article, or the gypsum produced in the manufacture of 'acid-phosphate,' completely prevents the loss of ammonia from the liquid part of the manure, and also from the organic nitrogen of the solids, provided the whole has, previous to fermentation, been made thoroughly compact, and atmospheric air almost completely excluded. Where it is found impossible to attend to the latter precautions, the safest way will probably be found to lie in avoiding fermentation altogether, by conveying the fresh manure, after treatment with gypsum, on the field to be manured and bringing it under the soil as rapidly as possible. The latter practice has been proved to be most advantageous by the experiments which have been carried on for some time past, at the Central Experimental Farm by Director Saunders. (See Reports for 1898.)

Not only has the addition of substances which have the faculty of fixing ammonia been recommended for stable manure, but its improvement to a greater extent has been proposed by the addition of fertilizers. The following quotation is taken from Bulletin No. 45 (for March, 1897) of the Massachusetts Agricultural College, and was written by Dr. C. A. Goessmann, Chemist for that institution :—

'The practice of adding to the manurial refuse materials of the farm as stable manure, vegetable compost, &c., such single commercial manurial substances as will enrich them in the direction desirable for any particular crop to be raised, does not yet receive that degree of general attention which it deserves.' (The italics are in the original.) 'An addition of potash in the form of muriate or sulphate of potash, or of phosphoric acid in the form of fine ground South Carolina or Florida soft phosphate, &c., will in many instances not only improve their general fitness as complete manure, but quite frequently permit a material reduction in the amount of barn-yard manure ordinarily considered sufficient to secure satisfactory results.'

'Average composition of seventy-five samples of barn-yard manure :—

	Per cent.	Lbs. per ton.
Moisture.....	67.00	1,340.0
Nitrogen.....	0.52	10.4
Potassium oxide.....	0.56	11.2
Phosphoric acid.....	0.39	7.8

'The average barn-yard manure contains, it will be noticed from the above statement, a larger percentage of nitrogen, as compared with its potash and phosphoric acid than is generally considered economical. An addition of from thirty to forty pounds of muriate of potash, and of one hundred pounds of fine ground natural phosphate (soft Florida or South Carolina floats) per ton of barn-yard manure would greatly increase its value as an efficient and economical general fertilizer.'

These are no doubt most excellent suggestions, and there is no reason why these substances should not be introduced into the stable manure in the same manner as in the case of the ground plaster above mentioned. Plain superphosphate and kainite might also be used, some of the constituents of which would be useful in fixing the ammonia, as soon as formed from the organic nitrogen. Should this suggestion be found to have practical value, there is no doubt that our fertilizer manufacturers would be found able to supply our farmers, at a moderate cost, with a mixture of ground plaster, superphosphate and kainite, in such proportions as experience might show to be most advantageous. No better application can be made of the wood ashes produced in the farmer's household than by mixing them with the barn-yard manure, and most excellent results are known to have followed this practice.

ACQUISITION OF NITROGEN.

Not only can the farmer save almost the whole of the nitrogen contained in the fodder fed to his cattle, but he can actually increase the stock of it stored away in his fields, agricultural products and manure heaps, by a judicious course of crop rotation. For more than a century agricultural chemists have discussed the question as to whether free, atmospheric nitrogen can be assimilated by plants, but it may now be regarded as perfectly settled in the affirmative, if regard is had only to the plants of the order leguminosae, such as beans, pease, lentils, vetches, clovers, alfalfa, serradella, &c. Even the great English agriculturists, Sir J. B. Lawes and Sir Henry Gilbert, who had previously been of an opposite opinion, have now admitted that this appropriation of nitrogen has been completely proved. This acknowledgment was made by Sir Henry Gilbert, at a great meeting of agricultural chemists held at Halle, in Germany, in September, 1891. Thus, modern research has confirmed not only modern agricultural practice, but also the experience of antiquity, for Prof. W. Strecker has pointed out a passage in Pliny which says: 'Lupines require so little manure that they, in fact, replace it; vetches make the land more fertile. Corn should be sown where previously lupines or vetches have stood, because they enrich the land.'

It is not, however, to be supposed that this utilization of atmospheric nitrogen by leguminous plants can take place upon very poor soils or upon those destitute of the inorganic constituents which they require. The latter must in such cases be supplied in the shape of potash with some phosphoric acid, as was done with great success by Schultz, of Lupitz, a practical agriculturist in North Germany. In fact, had it not been for his investigations, the controversy above referred to might have continued without results up to the present hour.

Professor Kœnig, of Muenster, gives the following summary of Schultz's experience:—

'Schultz acquired the farm Lupitz in the year 1855; its soil consisted of a poor, cold diluvial sand; the profit in working it was very small. Lupines yielded, indeed, as a fodder tolerable results, but when used as green manuring for rye and oats, no return was obtained from them. The application of artificial manures produced good crops, but they did not pay; burnt lime showed itself to be too heating. The use of manure was more favourable, especially when fertilizers containing phosphoric acid were used at the same time. But at the best the total result was not satisfactory.

'Shortly after Schultz acquired Lupitz, the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse until the field in question became quite lupine "sick." Schultz made his first trial on this field, manuring it with 300 pounds kainite per morgen (1 Prussian morgen = 0.631 acre); the sickness was at once cured, and for twenty-five years afterwards Schultz grew lupines on this ground without interruption, always with the application of 300 pounds kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, 300 pounds kainite were applied here and ploughed in,

the ground was cured, although an application of phosphates had not produced the desired results.

The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results, according to the nature of the crops which preceded the grain. For instance while grain sowed after lupines and manured with potash and phosphates yield very good and remunerative harvests, these were not to be obtained if grain was grown after grain or after potatoes. This behaviour of these crops was explained by Schultz in this way : that lupines or deep-rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated, an amount sufficient to supply the wants of the following grain crops ; that, on the other hand, the application of potash and phosphates, to grain, after a preceding grain crop, is without effect, for the reason that the latter has consumed the stock of nitrogen. Grain crops always reduce this stock ; never increase it. Schultz has given the name of "nitrogen collectors" to the lupines and similar plants, while grains are called "nitrogen consumers." His system of rotation is therefore the following :—Sow first nitrogen collectors (lupines, pease, beans, vetches, clover, lucerne, serradella, &c.), or, as they have been called, renovating crops, and give them 300 pounds kainite per morgen, with perhaps an addition of 20 pounds phosphoric acid. After harvesting the nitrogen collectors, sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 pounds kainite and 20 pounds phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced and the purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element.

The foregoing description is taken from Professor König's 'Stickstoff Vorrath,' published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new and although they only confirmed experiences still older than his own. But his case was surprising and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which is not yet ended. Atwater, Wagner, Heiden, Hellriegel and many others have participated in these investigations, and Professor Wood, of the Storrs Agricultural School in Connecticut, has given the following general conclusions as the result of the work :—

1. 'Pease, alfalfa, serradella, lupine, clover in all probability, and apparently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.

2. 'There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.

3. 'That there is a connection between root tubercles and this acquisition of nitrogen is clearly demonstrated. What this connection is, what are the relations of micro-organisms to the root tubercles and the acquisition of nitrogen, and in general how the nitrogen is obtained are questions still to be solved.

4. 'The cereals with which the experiments have been completed have not manifested this power of acquiring nitrogen, nor do they have such tubercles as are found on the roots of legumes.

5. 'In the experiments here reported, the addition of soil infusions did not seem necessary for the production of root tubercles. A plausible supposition is that the micro-organisms or their spores were floating in the air and were deposited in the pots in which the plants grew.

6. 'As a rule the greater the abundance of root tubercles in these experiments, the larger and more vigorous were the plants and the greater was the gain of nitrogen from the air.

7. 'In a number of these experiments, as in similar ones previously reported, there was a loss of nitrogen instead of gain. The loss occurred where there were no root tubercles ; it was especially large with oat plants, and largest where they had the most nitrogen at their disposal in the form of nitrates. As the gain of nitrogen by the

legumes helps explain why they act as renovating crops, the loss in the case of the oats suggests a possible reason why they should appear to be an exhausting crop.

'Practical inferences:—The ability of legumes to gather nitrogen from the air helps to explain the usefulness of clover, alfalfa, pease, beans, vetches and cow pease as renovating crops, and enforces the importance of these crops to restore fertility to exhausted soils. The judicious use of mineral fertilizers (containing phosphoric acid, potash and lime) will enable the farmer to grow crops of legumes which, after being fed to his stock, will, with proper care, collect and preserve all manure, both liquid and solid, enable him to return a complete fertilizer in the shape of a barn-yard manure to his land. A further advantage of growing these crops is that the nitrogenous material, protein, which they contain in such great abundance, is especially valuable for fodder.'

From the foregoing it seems that, in the present condition of our knowledge, the conclusion may be drawn that the atmosphere stands ready to furnish the farmer, gratis, with all the organic constituents which his crops require, provided always that he, on his part, will exercise a sufficient amount of skill and intelligence in appropriating and retaining on his farm the fertilizing materials, and especially the nitrogen. If he does this, all that is necessary for him to provide, in order to replace the losses which his farm sustains from the sale of stock or produce, are the inorganic or mineral constituents of these, and especially the phosphoric acid and potash. There is much in all this to remind one of Sprengel and Liebig's teaching of fifty years ago, according to which a plant cannot thrive if its soil does not contain all the substances which are to be found in its ash.

UTILIZATION OF SEWAGE.

The losses in fertilizing material which are sustained, as above mentioned, on account of the neglect or unscientific treatment of barn-yard manure, are very trifling when compared with those which the community suffers in the almost total loss of the nitrogen, phosphoric acid and potash contained in human excreta. The utilization of such always becomes a subject for discussion when the question is raised as to how a cheaper class of manures than the artificial fertilizers can be obtained for use in agriculture.

Where the water carriage system of removing sewage and excrement has been introduced, nothing is to be hoped for in the recovery of their fertilizing constituents. Even in cases where, at large expense, establishments have been erected for the treatment of sewage by precipitation or similar methods, the products have been found to be entirely destitute of agricultural value. The greater part of the fertilizing constituents of sewage are in such a soluble condition, and have been diluted with water to such an extent, as to render their recovery economically impossible. It has been attempted in the neighbourhood of many cities in England and on the continent of Europe to use the sewage for irrigation and as liquid manure, but this method of utilization has been found to be in the highest degree imperfect. At Berlin, it has been proved, that of the nitrogen contained in its sewage, at the very most only 13·8 per cent is found in the agricultural products of all the magnificent farms irrigated by it in the neighbourhood of the city. When the use of water for removing house refuse is excluded, and ordure and urine are removed as manure in their natural state, their utilization is possible, and is made a source of revenue in such towns as Stuttgart, Groningen, Greifswald, &c. But the systems of this class which are in use have all their disadvantages, as is proved by the tendency which municipal authorities constantly show to adopt the water carriage system. The greatest disadvantage under which these systems labour is the difficulty caused by the offensiveness to sight and smell of the material with which they have to deal. This has been entirely met by the use of moss litter as an absorbent, deodorizer, and disinfectant.

MOSS MANURE.

The first public mention of the usefulness of moss litter as a deodorizer and absorbent seems to have been made by Dr. Ludwig Happe, in Braunschweig, in December, 1880, since which time its application for the purpose has gradually increased until now, when the system has been introduced into several towns in Germany, and is also prac-

tised in Congleton, Cheshire, England. In Canada this method of deodorizing human refuse has been in use for years at Caledonia Springs. It, of course at once recalls the dry earth system regarding which great expectations were at one time entertained. The advantages of moss litter over dry earth for the purposes in question are, however, very decided. They consist in the perfect inoffensiveness of the moss litter product, in the fact that one part of moss litter will deodorize and dry at least six parts of mixed excreta, and in the greater agricultural value of the resulting manure. Dry earth (which is required in quantity at least equal to that of the excreta) is valueless from an agricultural point of view, but this is not the case with moss litter, which, as its analyses show, often contains as much nitrogen as ordinary barn-yard manure. Numerous analyses have been made of moss litter manure as produced in Germany, and its average contents from seven different towns may here be stated.

	p. cent.	lbs. per ton.		Value per ton.
Nitrogen.....	0.644	13.28	at 13c.	\$1 72
Phosphoric acid.....	0.350	7.00	5	0 35
Potash.....	0.285	5.70	5½	0 30
Water.....	83.00			\$2 37

Numerous trials have been made on various crops with this manure, and very satisfactory results are always reported. In all cases it is stated to excel barn-yard manure even when the latter is used in much greater quantity.

In a paper read before the Royal Society of Canada, on May 27, 1902, Mr. T. Macfarlane describes a manner of applying the moss litter, by means of which the quantity used is much reduced, and the value of the resulting manure greatly increased.

Canada possesses in its bogs and swamps inexhaustible quantities of moss litter, which is frequently found in beds several feet in thickness lying above the peat. The following tests have been made in the Inland Revenue Laboratory of moss litter from various localities in the Dominion:—

	Moisture.	Ash.	Nitrogen.
	Per cent.	Per cent.	Per cent.
Moss litter, Berwick, N.S.....	14.40	1.16	1.26
Black muck, ".....	13.30	3.68	1.58
Moss from Great Village, N.S.....	63.44	3.46	0.63
Sphagnum moss from Shippegan, N.B.....	12.45	1.55	0.55
Light coloured moss litter from Lincoln Parish, N.B.....	11.55	1.40	1.79
Dark coloured sample from the foregoing locality.....	10.95	0.90	1.06
Moss litter from Musquash, N.B., upper layer.....	11.50	0.95	0.82
Moss litter from same locality, lower layer.....	12.50	0.90	0.72
Peat from St. Bridget, Province of Quebec.....	13.30	2.50	1.48
Peat from St. Hubert, Quebec.....	12.35	2.68	1.84
Light coloured moss litter from Caledonia Springs.....	10.00	1.60	2.95
Dark coloured moss litter from same locality.....	11.60	2.70	2.28
Peat from the same locality.....	10.05	3.90	2.94
Surface moss from the Mer Bleu at Exton's.....	10.85	2.80	0.71
Surface moss from the Mer Bleu at Baldwin's Farm.....	7.90	2.66	1.47
Surface moss from the Mer Bleu at Baldwin's Farm, 18 inches deep.....	27.90	1.72	1.64
Peat from Mer Bleu at McFadden's Farm, wide ditch, Navan.....	22.60	4.40	2.21
Peat from Mer Bleu, McFadden's Farm, narrow ditch, Navan.....	9.40	6.62	2.80
Peat from near Stratford, Ont.....	16.80	9.10	1.91
Hypnum moss from near Stratford, Ont.....	8.75	9.72	2.01
Moss litter from bog in Welland County, Ont.....	3.85	4.70	1.51
Peat lying underneath the foregoing.....	5.75	4.85	1.41
Peat from the same locality, lying ½ feet below surface.....	3.25	41.25	1.52
Peat from Dodson's bog, near Beaverton, Ont.....	18.42	9.04	1.89

The manufacture of moss litter has been attempted at Musquash, in New Brunswick, and it has been produced in Welland county, Ontario. From the latter locality several bags of the moss litter were supplied for experimental purposes, and Dr. Laberge, of Montreal, undertook to superintend the carrying out of an experiment to determine its deodorizing and absorbent qualities. He reported that 100 lbs. of moss litter were sufficient for drying 800 lbs. of ordinary excreta from privy pits in Montreal, and rendering it entirely inoffensive. A sample of the product remained for days in his office without attracting notice and, indeed, it was quite devoid of odour. Its analysis gave the following results:—

	p.c.	Lbs. per ton.		Value per ton.
Nitrogen.....	1.31	26.2	at 13c.	\$3 41
Phosphoric acid.....	0.90	18.0	" 5	0 90
Potash.....	0.14	2.8	" 5½	0 15
Water.....	.65.47			\$4 46

The valuation of ordinary fresh barn-yard manure with 75 per cent of water is about \$2 per ton; with 67 per cent water as in the case of the average given above by Dr. Goessmann, the value is nearly \$2.25. Therefore, much better results might be expected agriculturally from a 'moss manure' of the composition just described.

Moss litter might also be applied with great advantage in public urinals. When a sample of it was supersaturated with urine and artificially dried, and this process repeated several times, no offensive odours were developed and the product was found on analysis to contain 12.41 per cent of nitrogen, which is equal to a valuation of \$32.26 per ton.

These facts are reported in order to show that Canada possesses in her waste lands abundance of material which might be used in our towns and villages for the production of a very valuable manure, with the simultaneous introduction of very many sanitary advantages. It is not to be expected that cities or towns which are advantageously situated for the water carriage system, or which have already adopted it, will make any changes, but there are many towns and villages in the Dominion where the application of the moss litter system would be very suitable, and the authorities of which, by selling the product or giving it gratis to the farmers of the neighbourhood, might confer a great benefit on agriculture.